

A. Title of Research Task

N92-14503

Far Infrared Balloon-Based Limb Emission Measurements of HO<sub>x</sub> Gases in the Middle Atmosphere

B. Investigators and Institutions

P.I.: Dr. James M. Russell III, NASA Langley Research Center  
Co-I's: Dr. Bruno Carli, IROE, Firenze, Italy  
Dr. Ira G. Nolt, NASA Langley Research Center  
Dr. Susan Solomon, NOAA Aeronomy Laboratory

C. Abstract of Research Objectives

The aim of the measurements is to obtain vertical mixing profiles of hydrogen and halogen trace gases and to study the related processes of diurnal change, OH/HO<sub>2</sub> ratio, and HO<sub>x</sub> total budget involved in stratospheric ozone. The species to be measured in the first planned 1990 flight of this new series include OH, H<sub>2</sub>O<sub>2</sub>, HO<sub>2</sub>, HOCl, HBr, HCl, HF, H<sub>2</sub>O, HDO, O<sub>3</sub>, and isotopic O<sup>3</sup>.

D. Summary of Progress

The principal efforts of this cooperative international program with the Italian group under Dr. B. Carli have been: (1) the refurbishment and updating by the Istituto di Ricerca sulle Onde Elettromagnetiche (IROE), Italy, of the high-resolution Fourier transform spectrometer, (2) detector system construction by LaRC with the assistance of the University of Oregon and Queen Mary College, and (3) gondola engineering and flight planning with the JPL group of J. Riccio. Major improvements for the flight instrument include the incorporation of an improved pointing system, an input telescope for better vertical resolution, a linear motor mirror drive, improved spectral filters, and detector systems. In addition, a completely new flight electronics command and control system has been built in Italy based on the results of a cooperative system design effort with LaRC engineers. Thermal/vacuum testing of the flight instrument is scheduled for early 1990 at LaRC.

In addition, the analysis of past flight data and algorithm development has continued as a collaborative effort between LaRC and the Italian groups at Florence and Bologna. Recent analyses have been completed for the retrieval of the OH concentration profile and the first measurement of the HBr column concentration.

E. Publications

Carli, B. and J.H. Park, "Simultaneous Measurement of Minor Stratospheric Constituents with Emission Far-Infrared Spectroscopy," J. Geophys. Res., 93, 3851-3865, 1988.

Carli, B., M. Carlotti, B.M. Dinelli, F. Mencaraglia, and J.H. Park, "The Mixing Ratio of the Stratospheric Hydroxyl Radical from Far-Infrared Emission Experiments," J. Geophys. Res., (in press), 1989.

Park, J.H., B. Carli, and A. Barbis, "Stratospheric HBr Mixing Ratio Obtained from Far-Infrared Emission Spectra," Geophys. Res. Lett., (in press), 1989.